6.9.4

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

IN REPLY
REFER TO: OEA-095 March 1, 1999
MEMORANDUM

SUBJECT: Bunker Hill, CLP Metals Analysis, Data Validation
Case: 26747
SDG: MJAE80

147869
USEPA SF
1125002

FROM: Laura Castrilli, Chemist
Quality Assurance and Data Unit, OEA

TO: Mary Kay Voytilla, Regional Project Manager
Office of Environmental Cleanup

CC: Bruce Woods, Region 10 CLP TPO
Jim Stefanoff, CH2M Hill

The following is a validation of ICP-AES and mercury analyses of thirteen total samples from the Bunker Hill project. The analyses were performed following the USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis Multi-media, Multi-Concentration, ILM04.0. Analyses were conducted by Chemtech Consulting Group of Englewood, New Jersey. This validation was conducted for the following samples:

MJAE80	MJAE82	MJAE84	MJAE86	MJAE96	MJAE98	MJAF00
MJAE81	MJAE83	MJAE85	MJAE87	MJAE97	MJAE99	

Data Qualifications

The following comments refer to the Chemtech Laboratory's performance in meeting quality control specifications outlined in the *CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM04.0.* The comments presented herein are based on the information provided for the review.

1.0 Timeliness - Acceptable

The technical (40 CFR part 136) holding time from the date of collection for mercury in water is 28 days. The holding time for the remaining metals in water is 180 days. The samples were collected between 01/07/99 and 01/14/99. Mercury analyses were completed on 01/23/99. ICP-AES analyses were completed on 02/03/99.

2.0 Sample Preparation - Acceptable

The samples were prepared for mercury analyses on 01/12/99 (samples MJAE80-MJAE87) and 01/23/99 (samples MJAE96-MJAF00). The samples were prepared for ICP-AES analyses on 01/22/99.

3.0 Calibrations/Calibration Verifications - Acceptable

The samples were analyzed for mercury by CVAAS on 01/12/99 (samples MJAE80-MJAE87) and 01/23/99 (samples MJAE96-MJAF00). Initial calibrations included one blank and five standards. The curves were linear with correlation coefficients greater than 0.995.

The samples were analyzed by ICP-AES on 02/03/99. The instrument was standardized according to the analytical method each day of analysis using one blank and a single calibration standard for each element.

All ICP-AES and CVAAS (mercury) calibrations were performed as required and met the acceptance criteria; therefore, no qualification was made on this basis.

Continuing calibration verifications (CCVs) are required before and after sample analysis and after every 10 samples during analysis. Mercury recoveries must be within 80-120%. Other metal recoveries must be within 90-110%. The frequency of analysis of CCVs was met. All ICP-AES and CVAAS (mercury) CCVs (initial and continuing) bracketing reported sample results met the recovery criteria.

4.0 Laboratory Control Samples - Acceptable

Laboratory Control samples are digested and analyzed along with the samples to verify the efficiency of laboratory procedures. All recoveries associated with reported sample results met the acceptance criteria for control samples.

5.0 Blanks -

Procedural blanks were prepared with the samples to show potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified if the analyte concentration was less than five times the analytical value in the blank.

Arsenic was detected in the ICP-AES preparation blank. Copper, nickel, and iron results in the preparation blank had negative results with absolute values greater than the respective detection limits. Aluminum, arsenic, calcium, magnesium, manganese, and zinc were detected in one or more ICP-AES continuing calibration blanks (CCBs). Copper, iron, potassium, vanadium, and zinc in some CCBs had negative values with absolute values greater than the respective detection limits. Based on blank contamination, associated sample results were qualified as follows:

- arsenic and aluminum in sample MJAE87 was qualified 'U'
- nickel in sample MJAE83 was qualified 'J'
- vanadium in samples MJAE96-MJAF00 was qualified 'UJ'

All other sample results were greater than five times the associated blank levels (or were already undetected) and were not qualified based on blank contamination.

6.0 ICP-AES Interference Check Sample -

The interference check sample (ICS) is analyzed by ICP-AES to verify interelement and background correction factors. Analysis is required at the beginning and end of each sample analysis run and recoveries must be between 80% and 120%. All ICS recoveries associated with reported sample results were within the recovery criterion.

The raw data for a number of samples had interfering levels of iron. Analytes for which iron is an interferent were qualified as follows:

- Vanadium in samples MJAE80-MJAE82, MJAE84-MJAE86, MJAE97-MJAE99 was qualified 'UJ', estimated detection limit (possible false negative due to high iron) as vanadium in the three ICS-A analyses bracketing these samples had negative results with absolute values greater than the detection limit.

Some of the samples required one or more dilution runs to report zinc, iron, and manganese results within the instrumental linear range. The raw data for all analytes were compared using the available dilutions to see if 1) zinc, iron, and/or manganese levels in the undiluted samples were high enough that interelement corrections may not be sufficient for the analytes that were reported from the undiluted analyses or 2) a pattern of suppression or enhancement was evident.

From this comparative study, the following results were qualified due to suspected interference (analytes already qualified due to poor serial dilution results were not qualified again, see section 11 for qualification due to serial dilution):

- Aluminum, arsenic, cadmium, calcium, cobalt, copper, and nickel were qualified 'J', estimated (pattern of suppression/possible low bias) in sample MJAE81.
- Cadmium, calcium, and magnesium were qualified 'J', estimated (pattern of suppression/possible low bias) in sample MJAE82.
- Aluminum and zinc were qualified 'J', estimated (pattern of suppression/possible low bias) in samples MJAE84 and MJAE86.
- Antimony was qualified 'UJ', estimated detection limit (possible false negative) in sample MJAE86.
- Aluminum and cadmium were qualified 'J', estimated (pattern of suppression/possible low bias) in sample MJAE99.

7.0 Duplicate Analysis - Acceptable

Duplicate analyses were done on sample MJAE85. Water duplicate results were within the ±20% Relative Percent Difference (RPD) or ±CRDL criteria for water results < 5 times the CRDL criteria. No qualification was made on this basis.

8.0 Field Duplicate Analysis - Not Applicable

Field duplicate analysis for samples in this SDG was not indicated in the field collection documentation.

9.0 Matrix Spike Analysis -

Matrix spike sample analyses are done to provide information about the effect of the sample matrix on digestion and measurement methods. Matrix spike recovery must be within the limits of 75 - 125%.

Matrix spike analyses were done on sample MJAE85. All matrix spike recoveries were within the required QC limits, with the exception of thallium (zero percent recovery). Undetected thallium results (most samples) were qualified 'R', unusable while detected thallium results were qualified 'J', estimated (possible low bias).

10.0 Graphite Furnace Atomic Absorption Spec (GFAAS) QC - Not Applicable -

GFAAS was not used for the analysis of these samples.

11.0 ICP-AES Serial Dilution - Acceptable

Sample MJAE85 was analyzed by ICP-AES serial dilution to check for potential interferences. All analytes which exceeded the minimum concentration criterion (50 times the IDL) agreed within the 10%D criteria; with the exception of nickel (10.1%), potassium (15.7%) and sodium (14.5%). All potassium and sodium results were qualified 'J', estimated due to serial dilution results. Since the nickel serial dilution was only slightly outside the acceptance criteria, sample results were not qualified on this basis and laboratory 'E' qualifiers were removed.

12.0 Detection Limits - Acceptable

Sample results which fall below the instrument detection limit (IDL) are assigned the value of the instrument detection limit and the 'U' qualifier is attached. Contract Required Detection Limit (CRDL) standards are required to demonstrate a linear calibration curve near the CRDL. CRDL standards were run at the required frequency.

13.0 Overall Assessment of the Data

This validation of the data is based on the criteria outlined in the *National Functional Guidelines for Inorganic Data Review (02/94).* Approximately 24.4% of the data was qualified based on blank contamination, interference, matrix spike recovery, or poor serial dilution results. The data as qualified is acceptable for all purposes.

Below are the definitions for the National Functional Guidelines for Inorganic Data Review (02/94) qualifiers used when validating/qualifying data from Inorganic analysis.

DATA QUALIFIERS

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. (Note: Analyte may or may not be present.)

UJ - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAE80

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 26747 SAS No.: SDG No.: MJAE80

Matrix (soil/water): WATER Lab Sample ID: 64289S

Level (low/med): LOW Date Received: 01/08/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	5510			P
7440-36-0	Antimony	3.0	U		P
7440-38-2	Arsenic	160			P
7440-39-3	Barium	10.7	B		P
7440-41-7	Beryllium	2.4	B		P
7440-43-9	Cadmium	373			P
7440-70-2	Calcium	28400			P
7440-47-3	Chromium	5.0	B		P
7440-48-4	Cobalt	109			P
7440-50-8	Copper	324			P
7439-89-6	Iron	220000			P
7439-92-1	Lead	275			P
7439-95-4	Magnesium	50600			P
7439-96-5	Manganese	38300			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	101		~~E~~	P
7440-09-7	Potassium	834	B	~~E~~ J	P
7782-49-2	Selenium	5.8			P
7440-22-4	Silver	2.0	U		P
7440-23-5	Sodium	1460	B	~~E~~ J	P
7440-28-0	Thallium	~~3.0~~	~~U~~	~~N~~ R	P
7440-62-2	Vanadium	1.0	U	J	P
7440-66-6	Zinc				NR
	Cyanide				NR

05/01/99

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: YELLW Clarity After: CLEAR Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAE81

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 26747 SAS No.: SDG No.: MJAE80

Matrix (soil/water): WATER Lab Sample ID: 64290S

Level (low/med): LOW Date Received: 01/08/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	298000		J	P
7440-36-0	Antimony	3.0	U		P
7440-38-2	Arsenic	9860		J	P
7440-39-3	Barium	32.4	B		P
7440-41-7	Beryllium	54.6			P
7440-43-9	Cadmium	13000		J	P
7440-70-2	Calcium	240000		J	P
7440-47-3	Chromium	258			P
7440-48-4	Cobalt	3980		J	P
7440-50-8	Copper	13800		J	P
7439-89-6	Iron	13400000			P
7439-92-1	Lead	4.4			P
7439-95-4	Magnesium	1640000			P
7439-96-5	Manganese	1810000			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	3490		~~E~~ J	P
7440-09-7	Potassium	602	B	~~E~~ J	P
7782-49-2	Selenium	65.7			P
7440-22-4	Silver	2.0	U		P
7440-23-5	Sodium	1030	B	~~E~~ J	P
7440-28-0	Thallium	~~3.0~~	~~U~~	~~N~~ R	P
7440-62-2	Vanadium	1.0	U	J	P
7440-66-6	Zinc	15700000			P
	Cyanide				NR

4/26/03/21/99

Color Before: BROWN Clarity Before: CLOUDY Texture:

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAE82

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 26747 SAS No.: SDG No.: MJAE80

Matrix (soil/water): WATER Lab Sample ID: 64291S

Level (low/med): LOW Date Received: 01/08/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	25400			P
7440-36-0	Antimony	3.0	U		P
7440-38-2	Arsenic	834			P
7440-39-3	Barium	12.4	B		P
7440-41-7	Beryllium	11.2			P
7440-43-9	Cadmium	2610		J	P
7440-70-2	Calcium	66500		J	P
7440-47-3	Chromium	35.7			P
7440-48-4	Cobalt	377			P
7440-50-8	Copper	2100			P
7439-89-6	Iron	2460000			P
7439-92-1	Lead	762			P
7439-95-4	Magnesium	132000		J	P
7439-96-5	Manganese	208000			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	377		~~E~~	P
7440-09-7	Potassium	829	B	~~E~~ J	P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	2.0	U		P
7440-23-5	Sodium	1390	B	~~E~~ J	P
7440-28-0	Thallium	~~3.0~~	~~U~~	~~N~~ R	P
7440-62-2	Vanadium	1.0	U	J	P
7440-66-6	Zinc	1360000			P
	Cyanide				NR

2/2 05/01/99

Color Before: YELLOW Clarity Before: CLOUDY Texture:

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAE83

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 26747 SAS No.: SDG No.: MJAE80

Matrix (soil/water): WATER Lab Sample ID: 64292S

Level (low/med): LOW Date Received: 01/08/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	529			P
7440-36-0	Antimony	3.0	U		P
7440-38-2	Arsenic	28.8			P
7440-39-3	Barium	5.5	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	1.0	U		P
7440-70-2	Calcium	4670	B		P
7440-47-3	Chromium	1.0	U		P
7440-48-4	Cobalt	6.1	B		P
7440-50-8	Copper	25.8			P
7439-89-6	Iron	15200			P
7439-92-1	Lead	23.7			P
7439-95-4	Magnesium	1630	B		P
7439-96-5	Manganese	1450			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	4.5	B	~~E~~ J	P
7440-09-7	Potassium	440	B	~~E~~ J	P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	2.0	U		P
7440-23-5	Sodium	1060	B	~~E~~ J	P
7440-28-0	Thallium	5.1	B	~~N~~ J	P
7440-62-2	Vanadium	1.0	U		P
7440-66-6	Zinc	409			P
	Cyanide				NR

S/MC03/01/99

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAE84

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 26747 SAS No.: SDG No.: MJAE80

Matrix (soil/water): WATER Lab Sample ID: 64293S

Level (low/med): LOW Date Received: 01/08/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	884		J	P
7440-36-0	Antimony	3.0	U		P
7440-38-2	Arsenic	33.3			P
7440-39-3	Barium	13.2	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	17.1			P
7440-70-2	Calcium	346000			P
7440-47-3	Chromium	44.6			P
7440-48-4	Cobalt	209			P
7440-50-8	Copper	31.8			P
7439-89-6	Iron	133000			P
7439-92-1	Lead	602			P
7439-95-4	Magnesium	372000			P
7439-96-5	Manganese	326000			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	200		~~E~~	P
7440-09-7	Potassium	15700		~~E~~ J	P
7782-49-2	Selenium	122			P
7440-22-4	Silver	13.9			P
7440-23-5	Sodium	5520		~~E~~ J	P
7440-28-0	Thallium	~~3.0~~	~~U~~	~~N~~ R	P
7440-62-2	Vanadium	1.0	U	J	P
7440-66-6	Zinc	31200		J	P
	Cyanide				NR

05/01/99

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAE85

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 26747 SAS No.: SDG No.: MJAE80

Matrix (soil/water): WATER Lab Sample ID: 64294S

Level (low/med): LOW Date Received: 01/08/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	2110			P
7440-36-0	Antimony	3.0	U		P
7440-38-2	Arsenic	65.2			P
7440-39-3	Barium	24.1	B		P
7440-41-7	Beryllium	1.2	B		P
7440-43-9	Cadmium	119			P
7440-70-2	Calcium	212000			P
7440-47-3	Chromium	24.2			P
7440-48-4	Cobalt	164			P
7440-50-8	Copper	115			P
7439-89-6	Iron	131000			P
7439-92-1	Lead	560			P
7439-95-4	Magnesium	238000			P
7439-96-5	Manganese	193000			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	149		~~E~~	P
7440-09-7	Potassium	9010		~~E~~ J	P
7782-49-2	Selenium	58.1			P
7440-22-4	Silver	2.0	B		P
7440-23-5	Sodium	4220	B	~~E~~ J	P
7440-28-0	Thallium	~~3.0~~	~~U~~	~~N~~ R	P
7440-62-2	Vanadium	1.0	U	J	P
7440-66-6	Zinc	68200			P
	Cyanide				NR

03/01/99

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAE86

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 26747 SAS No.: SDG No.: MJAE80

Matrix (soil/water): WATER Lab Sample ID: 64297S

Level (low/med): LOW Date Received: 01/08/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1890		J	P
7440-36-0	Antimony	3.0	U	J	P
7440-38-2	Arsenic	65.2			P
7440-39-3	Barium	20.9	B		P
7440-41-7	Beryllium	1.0	B		P
7440-43-9	Cadmium	103			P
7440-70-2	Calcium	189000			P
7440-47-3	Chromium	18.8			P
7440-48-4	Cobalt	139			P
7440-50-8	Copper	110			P
7439-89-6	Iron	118000			P
7439-92-1	Lead	514			P
7439-95-4	Magnesium	212000			P
7439-96-5	Manganese	180000			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	134		~~E~~	P
7440-09-7	Potassium	7780		~~E~~ J	P
7782-49-2	Selenium	50.9			P
7440-22-4	Silver	2.4	B		P
7440-23-5	Sodium	3800	B	~~E~~ J	P
7440-28-0	Thallium	~~3.0~~	~~U~~	~~N~~	P
7440-62-2	Vanadium	1.0	U	J	P
7440-66-6	Zinc	58600		J	P
	Cyanide				NR

2/2/03/01/99

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAE87

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 26747 SAS No.: SDG No.: MJAE80

Matrix (soil/water): WATER Lab Sample ID: 64298S

Level (low/med): LOW Date Received: 01/08/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	92.3	~~B~~	U	P
7440-36-0	Antimony	3.0	U		P
7440-38-2	Arsenic	4.5	~~B~~	U	P
7440-39-3	Barium	82.9	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	13.4			P
7440-70-2	Calcium	19300			P
7440-47-3	Chromium	1.7	B		P
7440-48-4	Cobalt	13.9	B		P
7440-50-8	Copper	23.6	B		P
7439-89-6	Iron	2430			P
7439-92-1	Lead	452			P
7439-95-4	Magnesium	34100			P
7439-96-5	Manganese	11200			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	17.2	B	~~E~~	P
7440-09-7	Potassium	857	B	~~E~~ J	P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	2.0	U		P
7440-23-5	Sodium	1720	B	~~E~~ J	P
7440-28-0	Thallium	6.6	B	~~N~~ J	P
7440-62-2	Vanadium	1.0	U		P
7440-66-6	Zinc	3490			P
	Cyanide				NR

03/01/99

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAE96

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 26747 SAS No.: SDG No.: MJAE80

Matrix (soil/water): WATER Lab Sample ID: 64978S

Level (low/med): LOW Date Received: 01/15/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	869			P
7440-36-0	Antimony	3.8	B		P
7440-38-2	Arsenic	172			P
7440-39-3	Barium	15.0	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	145			P
7440-70-2	Calcium	9180			P
7440-47-3	Chromium	1.8	B		P
7440-48-4	Cobalt	15.1	B		P
7440-50-8	Copper	336			P
7439-89-6	Iron	68200			P
7439-92-1	Lead	961			P
7439-95-4	Magnesium	6140			P
7439-96-5	Manganese	6680			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	16.4	B	#	P
7440-09-7	Potassium	915	B	# J	P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	2.0	U		P
7440-23-5	Sodium	1230	B	# J	P
7440-28-0	Thallium	4.6	B	# J	P
7440-62-2	Vanadium	1.0	U	J	P
7440-66-6	Zinc	33200			P
	Cyanide				NR

1/28/2/99

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAE97

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 26747 SAS No.: SDG No.: MJAE80

Matrix (soil/water): WATER Lab Sample ID: 64979S

Level (low/med): LOW Date Received: 01/15/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	6080			P
7440-36-0	Antimony	3.0	U		P
7440-38-2	Arsenic	608			P
7440-39-3	Barium	10.3	B		P
7440-41-7	Beryllium	4.5	B		P
7440-43-9	Cadmium	727			P
7440-70-2	Calcium	28600			P
7440-47-3	Chromium	12.2			P
7440-48-4	Cobalt	91.1			P
7440-50-8	Copper	421			P
7439-89-6	Iron	601000			P
7439-92-1	Lead	679			P
7439-95-4	Magnesium	66900			P
7439-96-5	Manganese	69900			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	97.0		~~E~~	P
7440-09-7	Potassium	640	B	~~E~~ J	P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	2.0	U		P
7440-23-5	Sodium	1490	B	~~E~~ J	P
7440-28-0	Thallium	~~3.0~~	~~U~~	~~N~~ R	P
7440-62-2	Vanadium	1.0	U	J	P
7440-66-6	Zinc	316000			P
	Cyanide				NR

dlt 03/01/99

Color Before: YELLOW Clarity Before: CLEAR Texture:

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAE98

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 26747 SAS No.: SDG No.: MJAE80

Matrix (soil/water): WATER Lab Sample ID: 64980S

Level (low/med): LOW Date Received: 01/15/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1840			P
7440-36-0	Antimony	9.2	B		P
7440-38-2	Arsenic	621			P
7440-39-3	Barium	24.5	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	31.0			P
7440-70-2	Calcium	9910			P
7440-47-3	Chromium	2.1	B		P
7440-48-4	Cobalt	5.4	B		P
7440-50-8	Copper	77.2			P
7439-89-6	Iron	233000			P
7439-92-1	Lead	1620			P
7439-95-4	Magnesium	11900			P
7439-96-5	Manganese	6350			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	5.4	B	~~E~~	P
7440-09-7	Potassium	545	B	~~E~~ J	P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	2.0	U		P
7440-23-5	Sodium	1200	B	~~E~~ J	P
7440-28-0	Thallium	~~3.0~~	~~U~~	~~N~~ R	P
7440-62-2	Vanadium	1.0	U	J	P
7440-66-6	Zinc	9530			P
	Cyanide				NR

03/01/99

Color Before: YELLOW Clarity Before: CLEAR Texture:

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAE99

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 26747 SAS No.: SDG No.: MJAE80

Matrix (soil/water): WATER Lab Sample ID: 64981S

Level (low/med): LOW Date Received: 01/15/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	30800		J	P
7440-36-0	Antimony	3.0	U		P
7440-38-2	Arsenic	3330			P
7440-39-3	Barium	15.7	B		P
7440-41-7	Beryllium	21.2			P
7440-43-9	Cadmium	3480		J	P
7440-70-2	Calcium	91900			P
7440-47-3	Chromium	90.1			P
7440-48-4	Cobalt	449			P
7440-50-8	Copper	2310			P
7439-89-6	Iron	3520000			P
7439-92-1	Lead	472			P
7439-95-4	Magnesium	175000			P
7439-96-5	Manganese	349000			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	463		~~E~~	P
7440-09-7	Potassium	535	B	~~E~~ J	P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	2.0	U		P
7440-23-5	Sodium	1780	B	~~E~~ J	P
7440-28-0	Thallium	~~3.0~~	~~U~~	~~N~~ R	P
7440-62-2	Vanadium	1.0	U	J	P
7440-66-6	Zinc	1780000			P
	Cyanide				NR

MC 03/01/99

Color Before: YELLOW Clarity Before: CLOUDY Texture:

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAF00

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 26747 SAS No.: SDG No.: MJAE80

Matrix (soil/water): WATER Lab Sample ID: 64982S

Level (low/med): LOW Date Received: 01/15/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	857			P
7440-36-0	Antimony	6.2	B		P
7440-38-2	Arsenic	178			P
7440-39-3	Barium	14.7	B		P
7440-41-7	Beryllium	1.0	B		P
7440-43-9	Cadmium	149			P
7440-70-2	Calcium	9470			P
7440-47-3	Chromium	2.2	B		P
7440-48-4	Cobalt	16.2	B		P
7440-50-8	Copper	313			P
7439-89-6	Iron	68400			P
7439-92-1	Lead	1190			P
7439-95-4	Magnesium	6360			P
7439-96-5	Manganese	6700			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	16.7	B	E	P
7440-09-7	Potassium	849	B	E J	P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	2.0	U		P
7440-23-5	Sodium	1390	B	E J	P
7440-28-0	Thallium	7.9	B	N J	P
7440-62-2	Vanadium	1.0	U	J	P
7440-66-6	Zinc	34800			P
	Cyanide				NR

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments: